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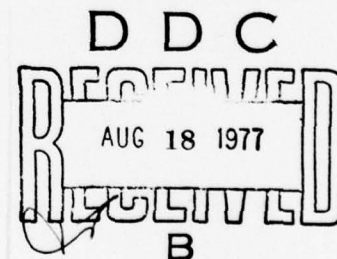
HEALTH CARE INFORMATION PROCESS

CONDITION-ACTION DIAGRAM
FLOWCHARTS

OVERVIEW

AD-A043213

US ARMY TRIMIS AGENCY
Walter Reed Army Medical Center
Washington, D.C. 20012



December 1976

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report is a general overview of and introduction to the US Army Tri-Service Medical Information Systems Agency (TRIMIS-Army) effort to analyze and flowchart the manual information handling operations in military Medical Treatment Facilities (MTF). In particular, Walter Reed Army Medical Center (WRAMC), a large facility whose new hospital will have a capacity of 1,280 beds and approximately 200,000 outpatient visits per year, was chosen as the object of this effort. WRAMC was selected for analysis because, due to its		

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size, it includes a superset of the capabilities of most MTF's, and is also the chosen prototype site for TRIMIS integrated computerized systems to be installed in the future.

This introductory volume includes background material and overview of TRIMIS and the charting effort, introduction and interpretation guides to the charting methodology, as well as indexes to all the charted processes of each of the subsystems included in this series of reports.

13 MAY 1977

DASG-ISZ (13 Apr 77) 1st Ind
SUBJECT: Publication of Health Care Condition Action Flow-Charts

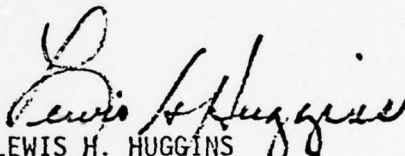
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LEWIS H. HUGGINS
Colonel, MSC
Executive Officer

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ACKNOWLEDGEMENTS

These flowcharts were developed by personnel of the US Army TRIMIS Agency (TRIMIS-Army) under the capable management of LTC James Wilburn, Director. Especial thanks are due to the personnel of Walter Reed Army Medical Center (WRAMC) without whose participation and patience neither the analysis upon which the charts are based nor their subsequent review would have been possible. Graphic production of the charts from pencil originals was done under contract by JANDS, Inc., Silver Spring, Maryland.

Additional gratitude is expressed to the following individuals who made signal contributions to the effort: Dr. James Levy who, as chief of the Development Office and the Modeling Effort, initiated the charting project; CPT Fred Bock, now with USARIEM, who developed the initial charting guidelines, and coordinated and monitored the graphic production of the charts themselves; and the secretaries of TRIMIS-Army, all of whom had a hand in the tedious job of typing these manuscripts.

To all: Your participation, help, and support is gratefully acknowledged.

--Karl Schank, Editor
7 December 1976

SUBJECTS OF VOLUMES IN THIS SERIES

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*"TRIMIS-Army TR 1" refers to the entire 10- Volume series; "TRIMIS-Army TR 1-nn", with appropriate "nn" as above, refers to a specific volume.

"The successful design of anything depends on two activities: *analysis* and *synthesis*. To construct a toothbrush, a chair, a health center building or a city, the designer must first analyze to the last detail the needs that are to be fulfilled by the object he is designing. Second, he must synthesize the fulfillment of these needs into the form that the object will take."

Robert A. Little and George F. Dalton*

*Little, R. A. and Dalton, G. F. "Designing the Community Health Foundation Center," in Yedidia, A. Planning and Implementation of the Community Health Foundation, Cleveland, Ohio. Washington DC: US Department of Health, Education and Welfare, 1968, p. 42.

INTRODUCTION

OVERVIEW OF THE TRIMIS PROGRAM

The Tri-Service Medical Information Systems (TRIMIS) program was formally created 11 July 1974 by the Department of Defense (DOD) Assistant Secretaries of Defense (Comptroller) and (Health and Environment) in order to consolidate previous service efforts and to "Improve the effectiveness and economy of health care delivery in the Army, Navy and Air Force." As this original tasking assignment stated, "TRIMIS will include development of automated information systems for timely patient-centered health data, supporting medical services, clinical research, epidemiological and health care information." This program is now managed and administered by the TRIMIS Program Office (TPO) of the Office of the Assistant Secretary of Defense (Health Affairs) which was created by DOD Directive 6000.5.

The concept of the TRIMIS system, as delineated on the 31 March 1976 TRIMIS ADP Development Plan includes various integrated health care systems projects which include stand-alone systems and a longer-range Integrated Hospital System (IHS) Project), direct health care support systems projects, medical management information systems projects. The individual projects that are included in the first category include development and/or procurement of the following subsystems:

- o wards and clinics (hospital information system)
- o patient administration (PAD)
- o patient appointments (PAS)
- o pharmacy
- o clinical laboratory
- o radiology
- o food service
- o hospital logistics

OVERVIEW OF THE FLOWCHARTING EFFORT

Inherent in any development or acquisition project is an analysis of the existing situation, as synthesis cannot proceed except based on the foundation formed by analysis of needs. To this end, the US Army TRIMIS Agency (Army component of the TRIMIS program and field activity of the Army Office of the Surgeon General) conducted an analysis of Walter Reed Army Medical Center (WRAMC). WRAMC was chosen as the site to analyze because its size and complexity which make it a superset of the activities at most other Army Medical Treatment Facilities (MTF). Further, it has been chosen as the prototype implementation site for the TRIMIS integrated system. Additionally, the mission of the Army TRIMIS Agency (TRIMIS-Army) include implementing improvements in a manual mode preparatory to ADP implementations whenever feasible.

These flowcharts are a result of the analysis and improvement efforts of TRIMIS-Army at Walter Reed. They depict the existing, and in some cases planned, operations of the MTF in a manual or technology-independent mode. The use of ADP is not part of these charts, although portions of them may be amenable to ADP support. As it was believed that no similar charting effort had been undertaken elsewhere, it was desired to make these charts available in hopes that they may prove of use to others, perhaps as a model, an object of discussion to help initiate and crystalize thought, or as a foil or straw man for criticism. It is not expected or intended that these charts will be used or implemented directly either in a manual or an ADP mode: the specific details would not transfer unaltered to any specific MTF. They may, however, provide a base from which to build and to extract.

More specifically, the purpose of these flowcharts is to present in easily understandable graphic form the major processing, material, personnel, and information flow involved in the above mentioned TRIMIS-related systems of a military MTF.

ORGANIZATION OF FLOWCHARTS

Each subsystem is presented as a separate stand-alone volume for ease of use. In this manner, the bulk does not become so cumbersome and, more importantly, functional distinction is preserved so that a specialist may concern himself only with the volume dealing with his own speciality if he so desires.

Similarly, each subsystem volume was developed by functionally-specific subsystem teams composed of both functional professionals and systems analysts. Thus there is diversity in team backgrounds, in functional subsystem details that affect the nature of the charts, and in the baseline system which was charted. This diversity has created a heterogeneity among the various charts and necessitates each subsystem volume including a description of exact nuances and interpretations of the standard symbology and structure used therein.

In general, however, the flowcharts are of the "condition-action" variety rather than the more common ANSI-standard ADP flowcharts. It was recognized early in the effort that the procedure-oriented ANSI charts were not as appropriate here because of their finer resolution and greater bulk, and because they were developed primarily for showing procedural flow of control and are relatively poor and cumbersome for representing information, material, and personnel flow. In this variety of flowcharts, the basic units of description are action (of any variety, performed by any actor or agent), enabling conditions and information (of any variety or media). These charts are rather more functionally (and declaratively) oriented than the algorithm-oriented ANSI charts. For a better visualization of this, see the sample description of symbols below, and the example which follows.

SAMPLE DIAGRAM INTERPRETATION GUIDE

The following pages are the PAS Condition-Action Diagram Interpretation Guide and Examples. They are presented here both to clarify and explain this charting technique and to aid in interpretation of the sample flowchart which follows.

CONDITION-ACTION
DIAGRAM INTERPRETATION GUIDE

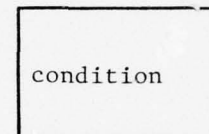
1. ACTION

When an action circle is encountered, the specified action, procedure, function, or process is to be performed as noted. An action is performed and never has a truth (true or false) value.



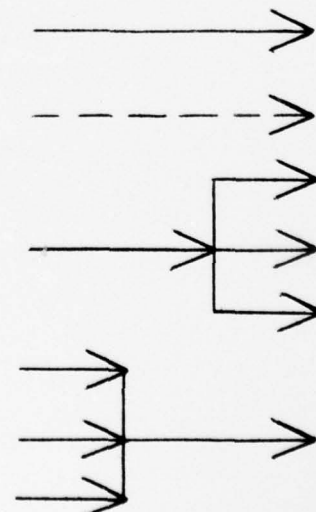
2. CONDITION

When a condition box is encountered, the specified condition is to be evaluated. If it holds true or succeeds, the following blocks on the diagram are to be executed. If the condition does not hold, then flow along this path of the diagram stops. The flow may, as appropriate, either be blocked permanently or may merely wait at the box pending the successful evaluation of the condition at some later time. A condition always has a truth (true or false) value.



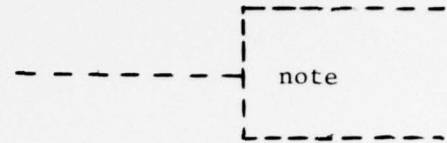
3. FLOWLINES

Flow proceeds through the diagram along the flowlines. When a flowline splits into multiple lines, all the lines must be followed (perhaps at once). If only one is intended, condition boxes will be used to select the proper line. When flowlines join or reconsolidate into a single line, that line is to be followed regardless of the number of joining lines that were active. Thus, there is no waiting at a junction. Control, execution, or interpretation of the diagram is shown by solid flowlines. Data and information are usually assumed to accompany control; but, where necessary for clarity, it is shown by "dash" lines, regardless of media.



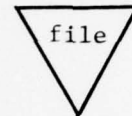
4. NOTE

Clarifying notes, comments, remarks, and other annotations, including references to additional documentation, are enclosed in "dash" note boxes and are connected to the annotated structure by "dash" lines.



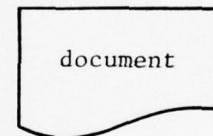
5. STORAGE

A triangular storage block indicates storage of information or data regardless of the medium of storage. Thus, only "dash" data flow lines--not solid control lines--will connect to storage blocks.



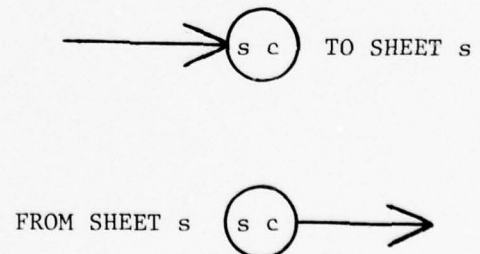
6. DOCUMENT

A document symbol represents information or data, regardless of media. (It may or may not physically reside on a document). It is used only for clarity, as information such as that contained in the "document" is assumed to be always present along with the control flow. Like the storage symbol, only "dash" data lines may connect to a document symbol.



7. CONNECTOR

A connector circle specifies that the flow continues on another page. An out-connector contains a number (which is the sheet number at which the flow is continued) and a letter (which specifies which in-connector on that sheet is being referenced). The in-connector contains the matching number/letter code. Adjacent to the connectors is a notation as to the sheet and process to, or from, which the connectors refer.



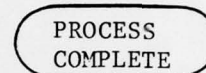
8. PROCESS

A striped process circle indicates a process to be performed. It is analagous to a high-level or meta-action. The process referenced will be diagramed in its own set of condition-action flowcharts which are included in the same packet of flowcharts for reference. After the process is performed, flow resumes.



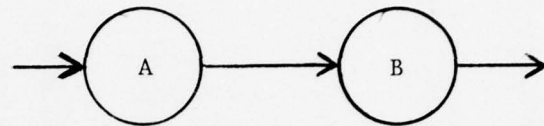
9. TERMINATOR

The oblong terminator symbol indicates that the current process or sub-process is complete. Normally, upon completion of a process, control returns to the process which invoked it and resumes where it left off in that process.

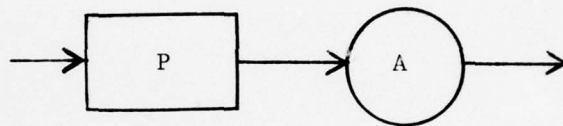


CONDITION-ACTION EXAMPLES

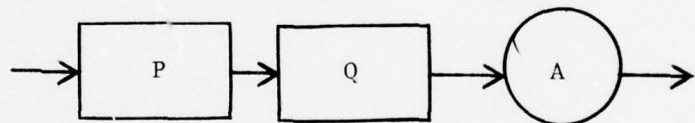
Perform Action A first,
then in sequence,
perform B.



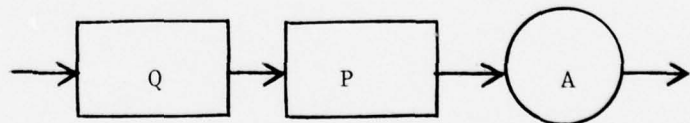
If Condition P holds true,
then perform Action A. If
P does not hold, do not
perform A.



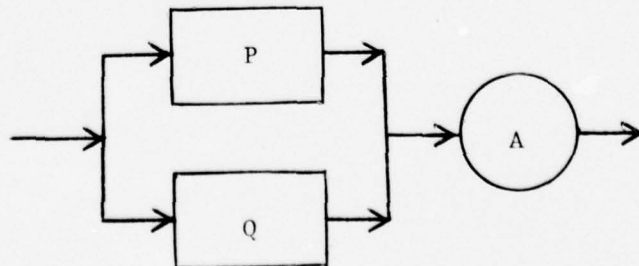
If both Condition P and
Condition Q hold true,
then perform A. If either
one does not hold, then
do not perform A.



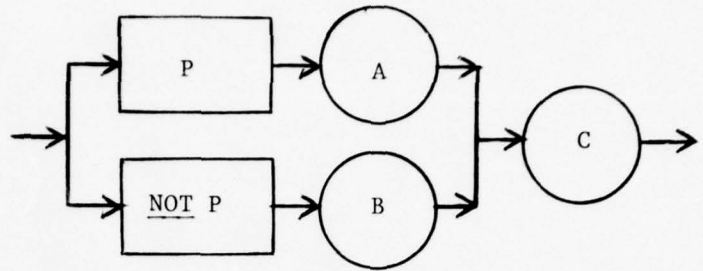
Same function and same net
result as above, but
evaluated in a different
sequence.



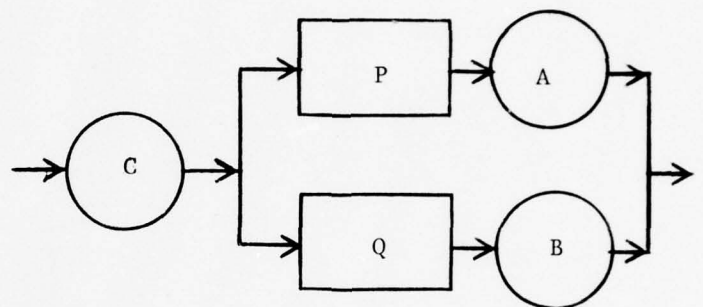
If either Condition P or
Condition Q holds true
(or both), then perform A.
If neither holds true,
then do not perform A.



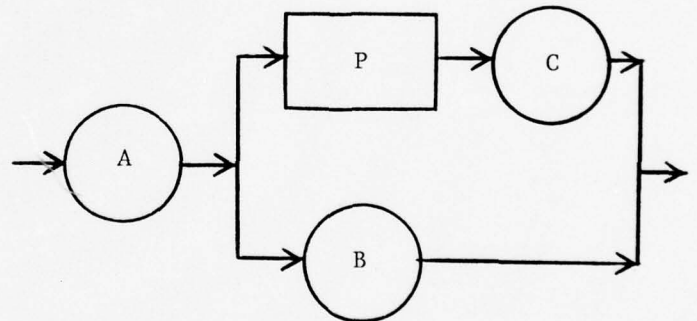
If Condition P holds true, then perform Action A, but not B. If P does not hold, then perform B, but not A. In any case, when done, perform C.



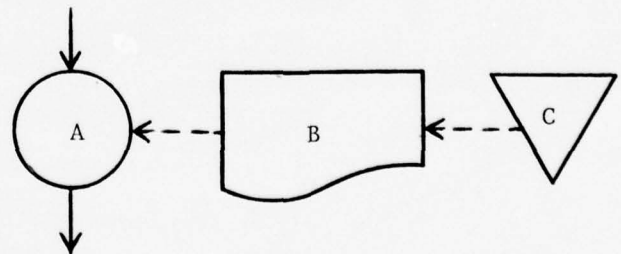
First perform Action C. Then, if Condition P holds true, perform Action A. If Condition Q holds true, then perform Action B. Note that both P and Q may hold, in which case both A and B will be performed.



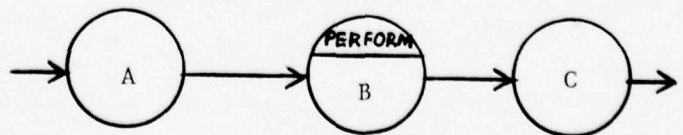
First perform Action A, then (in all case) perform Action B. Additionally, if Condition P holds true, then perform Action C (perhaps at the same time as Action B).



Perform Action A, utilizing information contained on the document B which was retrieved from the File C.



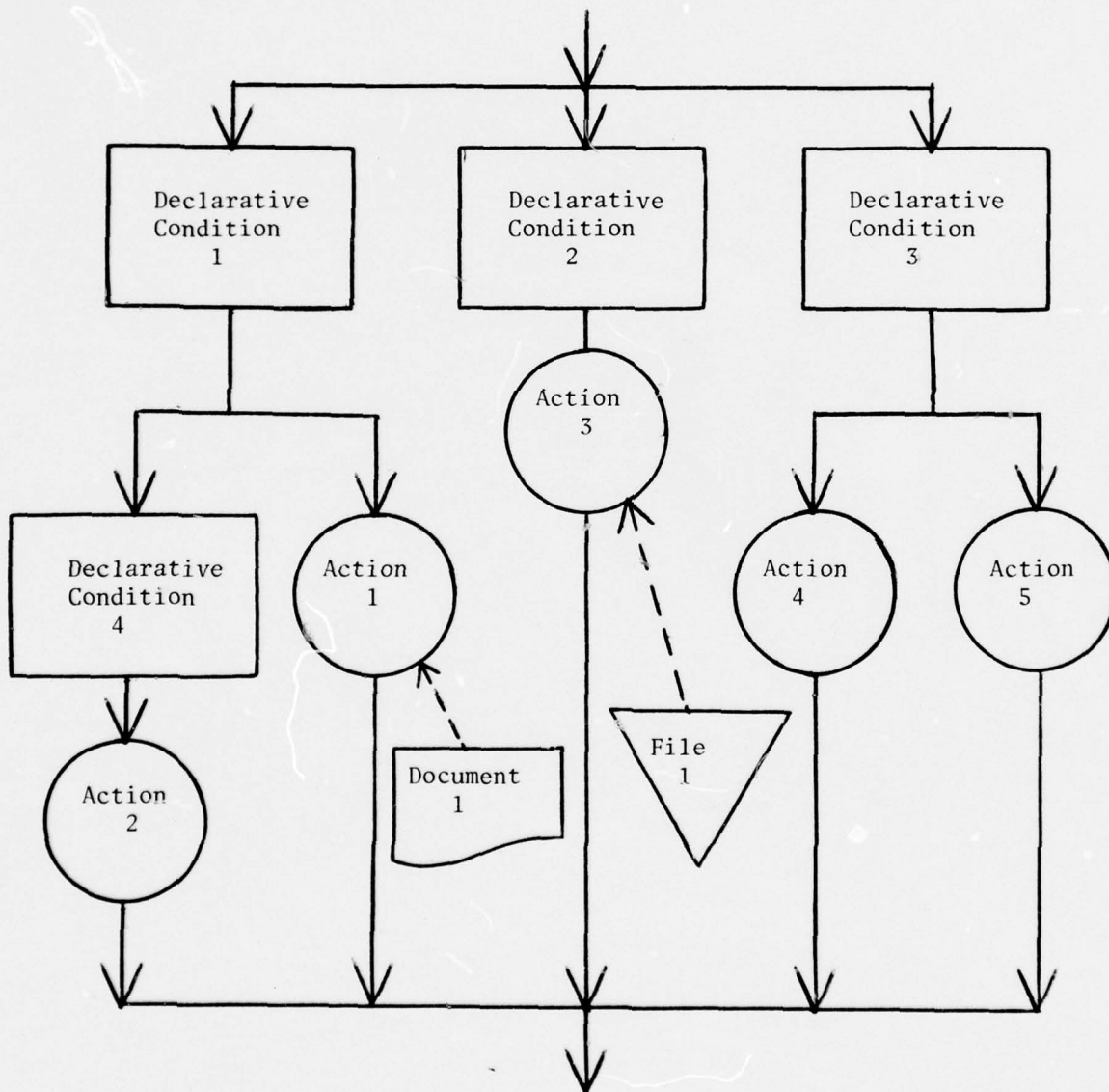
First perform Action A. Then perform Process B, which is itself flow-charted elsewhere in this set of charts. After B is completed, return to here and perform Action C.



Comparison to ANSI* ADP Flowcharts

The following two flowchart segments are roughly equivalent. They are chosen for compatibility: Many charts have no easy translation.

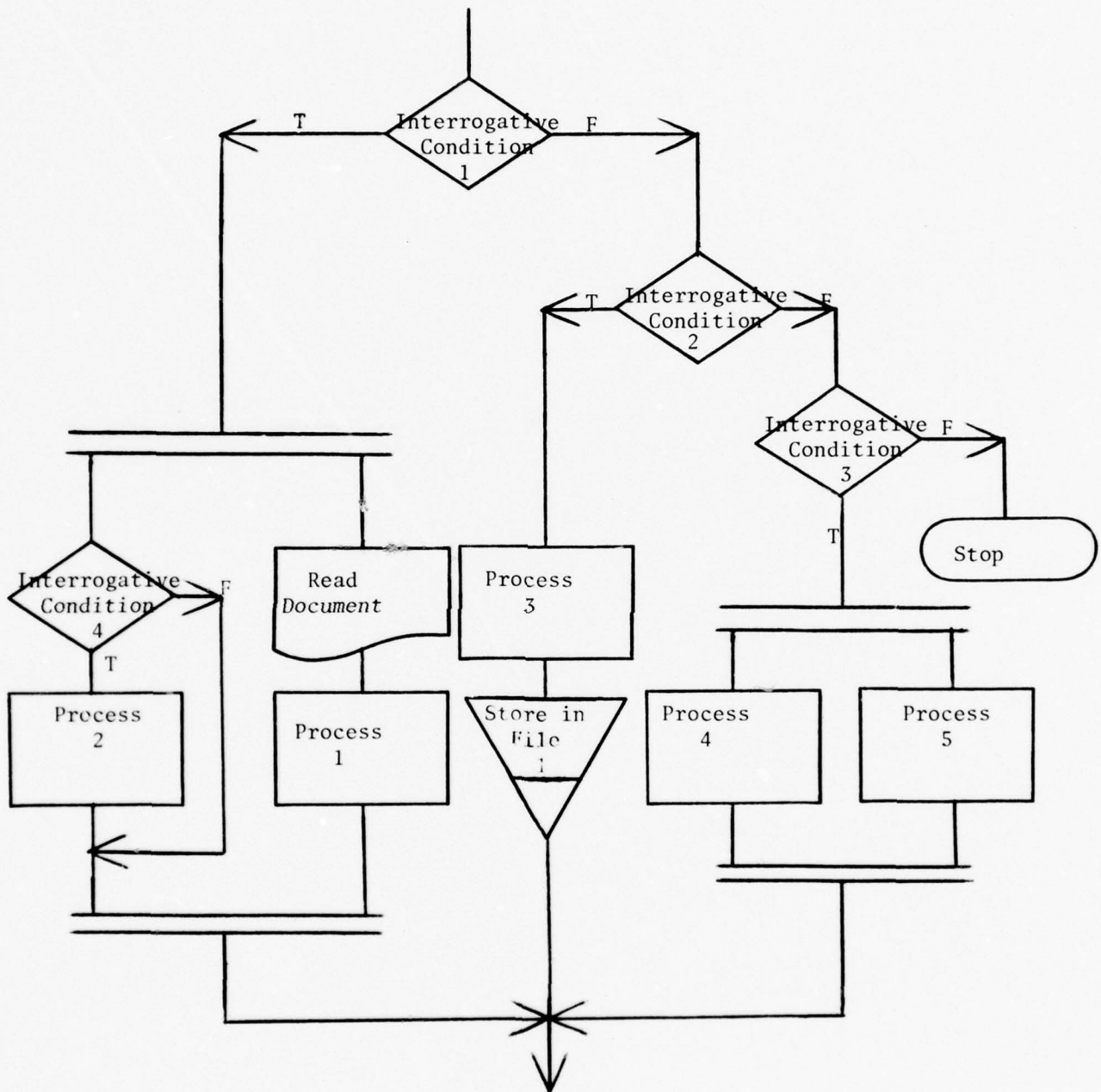
Condition-Action:



*Standardized as:

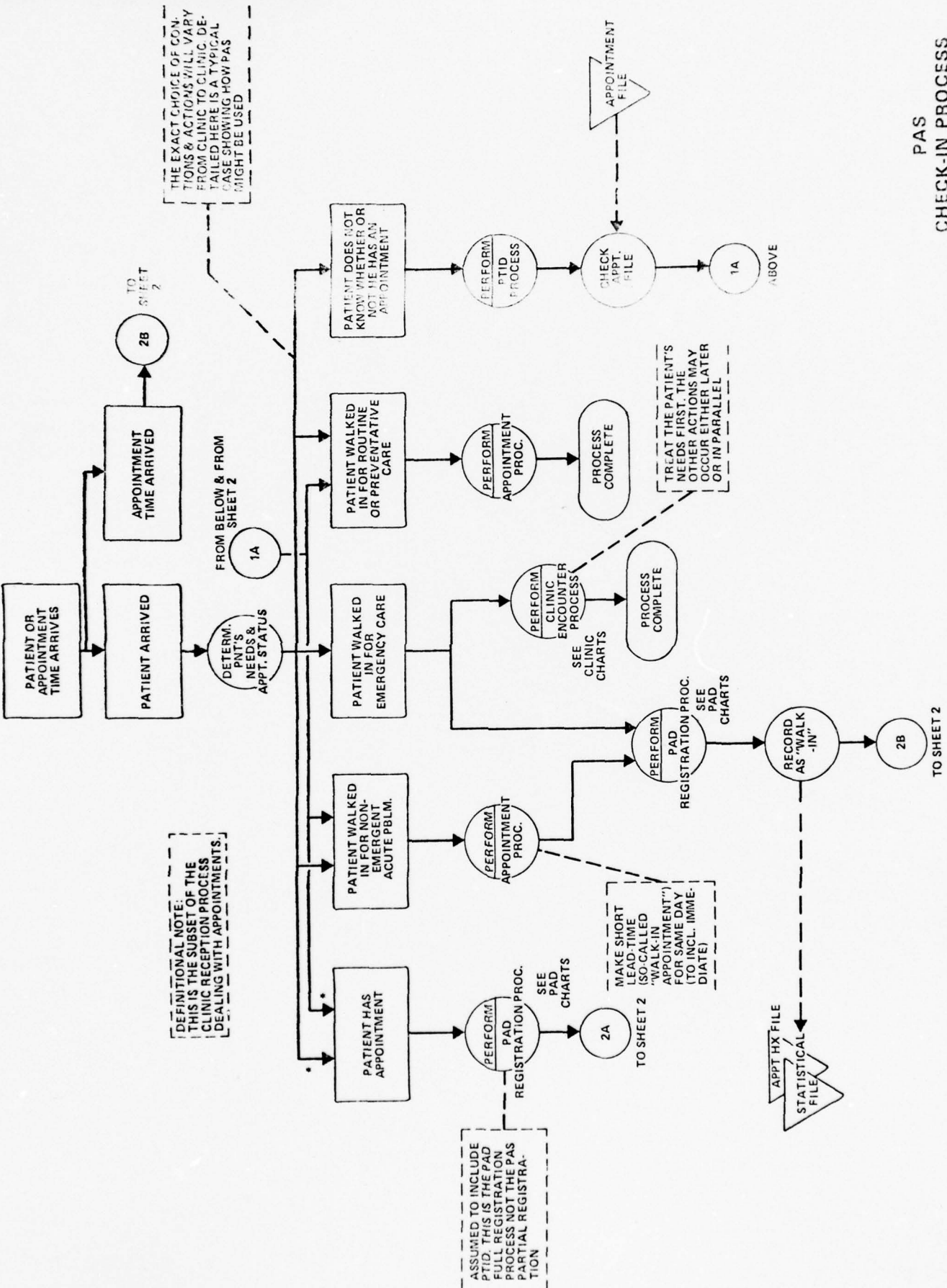
ANSI X3.5-1970, adopted as FIPS PUB 24, and adopted by DOD.

ANSI:



SAMPLE FLOWCHART DIAGRAMS

The following page is a sheet extracted from the PAS condition-action diagram flowcharts, and is presented as an example of the charting techniques and of the processes charted.



PAS
CHECK-IN PROCESS
SHEET 1 OF 2 3 NOV 1975

ANNOTED NARRATIVE EQUIVALENT OF SAMPLE CHART

Patient Appointments Check-In Process

1. This chart applies and is invoked whenever either a patient arrives in an ambulatory clinic or when a patient's appointment time arrives (e.g., the patient didn't show up on time).

2. If the time for the appointment has arrived, the details of subsequent processing are contained on another sheet (PAS sheet 2) starting at connector 2B. If the patient has arrived, details follow on this sheet. Note that if both conditions occur simultaneously, it is in general intended that both paths of the chart be followed, as here. Sequence of the two paths is not important, and may be parallel. (If sequence were important, the paths would have been combined into a single new path, with one old section before the other.

3. When the patient arrives, the receptionist or clinic clerk will ask and determine his needs and his appointment status. (Earlier charts in the series specified that the agent or actor in this case and for this entire chart is the clerk/receptionist.) Five possibilities are considered here (as noted, this will vary from clinic to clinic):

- a. The patient has an appointment (as indicated by the asterisk, this is the most frequent or common case);
- b. The patient walked in without an appointment for an acute (as opposed to routine or preventive care) but non-emergency health problem;
- c. The patient walked-in for emergency care;
- d. The patient walked-in for routine or preventative care.
- e. The patient does not recall whether or not he has a previously-made appointment.

Note that the nature of these conditions is such that they are mutually exclusive--only one case can occur at a time--so unlike item 2 above, only one chosen path will be followed. Each case is discussed in more detail below (as noted, details vary from clinic to clinic):

4. If the patient has an appointment, then register the patient by performing the PAD Registration process. When registration is completed, continue the PAS check-in process on sheet 2 at connector 2A.

5. If the patient walked-in for care for an acute problem, then first make an appointment for him (by performing the PAS Appointment Process)

for the same day. (Note that this may avoid some waiting if he can do other things in the area and come back at the appointed time, it gives him a definite appointment time rather than a vague assurance that if he waits long enough he will be worked-in somehow so it improves patient morale and care provider (CP) utilization. It also requires that the clinic has reserved some appointment slots for such occurrences.) After the patient is given an appointment, he is registered, recorded as a "walk-in" (as opposed to pre-appointed) for patient appointment history and statistical purposes, and the processing continues at 2B. (Note that the "files" mentioned may be paper forms, card files, logs, etc. or ADP disk files. Media is not important. What is important is that this an appropriate point to record such information.)

6. If the patient walked-in for true emergency care, then he is treated first (by performing the Encounter processes detailed on the clinic charts). He also must be registered and then checked-in as a "walk-in". However, in this situation these processes are of lower priority than the encounter (treatment) processes and may be done either at a later time, or may be done at the same time as the encounter but by different people. The branches of the diagram going to two circles signify this--both encounter and registration must be done, but not sequentially.

7. If the patient walked-in for routine or preventative care, then (in the clinic shown) an appointment is made for him and that is all--the PAS check-in process is complete. The patient will later return for care at the appointed time and date.

8. If the patient does not recall whether or not he had made an appointment, then determine who he is (by performing the PTID process) and then look-up his appointment in an appointment file. As in item 5 above, the medium (card file, roster, slips, ADP disk, etc. and organization (by patient name, patient number, time and date, etc.) of the file is not important here. Once his appointment status is determined, (connector 1A), appropriate actions (items 4,5,7 above) will be taken.

SOME COMMON ABBREVIATIONS USED IN THE CHARTS

ADP	Automatic Data Processing (Computers)
AMEDD	US Army Medical Department
c	with
clin	clinic
clk	clerk
commo	communications
CP	Care Provider (physician, dentist, nurse, etc.)
curr	current
determ	determine
doc	document
DOD	US Department of Defense
Dx	Diagnosis
FS	Food Service or Food Service Subsystem
HSC	USA Health Services Command
Hx	History
incl	including
info	information
Lab	laboratory or laboratory subsystem
log	log, record, journal
Log	logistics or logistics subsystem
MDS	Material Distribution Service
med rec	medical record(s)
mgt	management or managerial

MITRC	Medical Inpatient Treatment Recording Card (Inpatient ID Card)
MR	Medical Record(s)
MSA	Medical Service Accounts
MTF	Medical Treatment Facility (hospital, etc.)
MTRC	Medical Treatment Record Card (out-patient ID card)
MW/C	Model Ward and Clinic
NU	Nursing Unit (ward)
OSD	Office of the Secretary of Defense
OTSG	Office of the Surgeon General of the Army
PAD	Patient Administration Subsystem (or Patient Administration Division)
PAS	Patient Appointment Subsystem
pblm	problem (patient's medical problem)
persnl	personnel
Pharm	pharmacy or pharmacy subsystem
pnt	patient
POC	Point of Contact
pri care	primary care
proc	process or procedure
prod	product or produce
pt	patient
PTID	Patient Identification
Rad	radiology or radiology subsystem
reg	registration

registr	registration
rept	report
sched	schedule
sel	selected
spec'd	specified
stat	statistical
STAT	immediately (latin: <u>statim</u>)
susp	suspense or suspense file
TPO	TRIMIS Program Office, OSD, Washington, D.C.
TRIMIS	Tri-Service Medical Information System. Refers to the system, the project/program, and the organization.
TRIMIS-Army	USA TRIMIS Agency, Washington, D.C.
Unit	Ward (nursing unit) or clinic
US	United States
USA	US Army
w/	with
W/C	Ward and Clinics Subsystems
WRAMC	Walter Reed Army Medical Center, Washington, DC

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Tri-Service Medical Information System (TRIMIS) ADP Development Plan (TADP).
31 March, 1976.

DOD Directive 6000.5, SUBJECT: Tri-Service Medical Information System (TRIMIS)
Program. June 11, 1976.

Note--Additional references specific to each subsystem are included in the
appropriate subsystem volume.

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